

**SECTION 15930**  
**FAN POWERED HEPA FILTER UNITS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.

**1.2 SECTION INCLUDES**

- A. Requirements for fan powered HEPA filter units (or otherwise referred to as Fan-Filter units)
- B. Integral controls.

**1.3 REFERENCES**

- A. NFPA 90A – Installation of Air Conditioning and Ventilation Systems.
- B. UL 181 – Factory-Made Air Ducts and Connectors.
- C. MIL-STD-282 – Filter Units, Protective Clothing, Gas-Mask Components, and Related Products: Performance-Test Methods.
- D. UL 586 – Test Performance of High Efficiency Particulate, Air Filter Units.
- E. ISO-14644, Part 1 – Cleanroom Classification.

**1.4 SUBMITTALS**

- A. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
- B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings which indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- C. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at the scheduled static pressure of the unit.
- D. Manufacturer's Installation Instruction: Indicate support and hanging details, and service clearances required.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant volume regulators.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

## 1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

## 1.7 DELIVERY, STORAGE, AND PROTECTION

- A. The manufacturer shall transport, handle, store, and protect products, as required to provide units on site undamaged.

## 1.8 WARRANTY

- A. Warranty: Provide one year warranty including coverage of operating controls and electric motors, from the date of acceptance by the Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Clestra, Model Super II..
- B. Other acceptable manufacturers offering equivalent products.
  - 1. Flanders, Model 57.
  - 2. Meissner + Wurst.
  - 3. Huntair
- C. Substitutions: Not permitted.

### 2.2 FAN POWERED HEPA FILTERED UNITS

- A. Basic Assembly:
  - 1. Casings: Minimum 20 gage steel with powder coat epoxy enamel finish, or aluminum. All seams and penetrations shall be sealed with RTV silicone sealant. Provide four attachment points for suspension from overhead structural supports. Units shall be suitable for T-bar installation.
  - 2. Lining: Minimum ½ inch thick neoprene insulation, 1.5 lb/cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements. Face lining with 3 mil mylar film.
  - 3. A downstream diffuser, constructed of cold-rolled steel, painted with white epoxy, shall be flush mounted to the unit.
  - 4. Prefilter: 2 inches thick pleated prefilter with a minimum efficiency of 30 percent, rated per ASHRAE Standard 52-76, shall be provided as standard equipment on each fan-powered filter module.
- B. Integral HEPA Filter:
  - 1. The HEPA filter shall be Laminar Flow Grade, classified as per ISO-14644, Part 1, tested for resistance to airflow and overall penetration in accordance with MIL-STD-282. The entire face and perimeter of the filter pack shall be tested for leaks greater than .01 percent of the upstream challenge. For Class 1,000 areas the filter shall have a minimum efficiency of 99.999 percent on 0.3 micron particles per IES RP-CC-001-86 for Type C filters. For Class 100,000 areas the filter shall have a minimum efficiency of 99.95 percent on 0.5 micron particles, per IES-RP-CC-001-86 testing of HEPA filters or Type C filters. The average pressure drop (when clean) at a face velocity of 100 feet per minute shall not exceed 0.50 inches wg.
  - 2. The filter medium shall be all-glass with a wet strength, water-repellent binder and shall be produced by the filter manufacturer. The filter element shall be 2 inches deep

and shall be constructed by pleating a continuous sheet of medium, upon which a pattern of raised impressions has been formed, so that it is self-supporting without the use of separators. String, tape or adhesive separators shall not be acceptable. The raised areas shall align against each other to hold adjacent folds of the medium apart so that the pack is self-separating.

3. The filter element shall be permanently bonded to an extruded anodized aluminum frame with a solid urethane sealant. The perimeter of the filters service Class 1000 areas shall have a continuous double turn flange to seal the filter to its mounting frame in service.
4. Test results shall be furnished to the buyer/owner. Each filter and its carton shall bear labels indicating filter model number, compliance with IES RP-CC-001-86, the serial number, and the resistance and penetration readings taken for the filter.
5. The filters shall be individually enclosed in a polybag and packaged no more than two per carton. Each single filter or pair of filters shall be encased in a flanged, tight-fitting linerboard sleeve that fits within the filter shipping carton, leaving a minimum of 1-1/2 inch dead air space on each side. The top and bottom of the filters shall be protected by a folded linerboard cushion.

C. Fan Assembly:

1. Fan: Forward curved centrifugal type with direct drive permanent split capacitor type, thermally protected motor. Provide a disconnect switch with each motor.
2. Speed Control: Infinitely adjustable with electronic controls and mounted on unit.
3. Isolation: Fan/motor assembly on rubber isolators.
4. Electrical Characteristics:
  - a. 1/3 hp.
  - b. 277 Volts, Single Phase, 60 Cycle (HZ).
5. Sound: Maximum of 55 decibels at 5 feet and 75 fpm face velocity (100% coverage).
6. Wiring:
  - a. Prefabricated factory mounted wiring and controls. Mount electrical components in control box with removable cover. Incorporate single point electrical connection to power source.
  - b. Wiring Terminations: Wire fan and controls to terminal strip. Provide terminal lugs to match branch circuit conductor quantities, sizes and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

**Fan Filter Unit Schedule**

Tag	Room	Quantity	Electrical Chart				*CFM Min.	Remarks
			Volts	Amps	Phase	HZ		
FF-1	E-BEAM/LITHO	49	277	1.9	1	60	120	Class 1000
FF-2	SEM/MET	24	277	1.9	1	60	120	Class 1000
FF-3	SEM/FIB	21	277	1.9	1	60	120	Class 1000
FF-4	TEM/STEM	12	277	1.9	1	60	120	Class 100,000
FF-5	SEM/EDX	10	277	1.9			120	Class 100,000

\*Based on 4' x 2' (8-square feet) module.

**PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. Install filter frames according to manufacturer's written instructions.
- B. Position each filter unit with clearance for normal service and maintenance. Anchor filter-holding frames to substrate.
- C. Install filters in position to prevent passage of unfiltered air.
- D. Install a filter gage for each filter bank.
- E. Install filter gage static pressure taps upstream and downstream from filters to measure pressure drop through filter. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
- F. Coordinate filter installations with duct and air-handling unit installations.
- G. Electrical wiring and connections are specified in Division 16 Sections.
- H. Ground equipment.
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components, filter and filter-frame installation, and electrical wiring. Report results in writing.
- B. Operate each fan filter unit to demonstrate compliance with requirements. Test for leakage of unfiltered air while system is operating. Correct (or replace) malfunctioning fan filter units, and then retest to demonstrate compliance. Remove and replace units that cannot be corrected with new units and retest.
- C. HEPA Filters: Pressurize housing to a minimum of **3.0-inch WG (750 Pa)** or to designed operating pressure, whichever is higher; and test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.

### 3.3 CLEANING

- A. After completing system installation and testing, adjusting, and balancing air handling and air-distribution systems, clean filter housings and install new filter media.

**END OF SECTION 15930**